
LEARN TOOLS AND TECHNIQUES
OF SPSS
An E-Book guide on using
SPSS software written by
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DISCLAIMER

THIS IS A SAMPLE BOOK. A COMPLETE BOOK COVERED ALL THE BELOW GIVEN TOPICS.

TOPICS COVERED IN THIS BOOK:

- Introduction
- Type of Analysis
- Uni-variate Analysis
- Bi-Variate Analysis
- Association
- Chi-Square
- Normality Test

TOPICS COVERED IN THE COMPLETE BOOK:

- Introduction
- Types of analysis
- Uni-variate analysis
- Bi-variate analysis
- Qualitative analysis
- Quantitative analysis
- Regression model
- Simple linear regression
- Multiple linear regression
- Assumptions of linear regression
- Mean comparison
- Para metric tests
- Non-para metric tests
- Factor analysis

ANOVA, FISHER'S TEST, MANN WHITENY'S TEST, SPEARMAN RHO, KOLMOGROVE SMIRNOVE TEST, SPHARIO WILKS TEST, ONE SAMPLE TEST, K-INDEPENDENT TEST OR KRUSKAL-WALLIS TEST, KMO AND BARTLETT'S TEST

Introduction

This ebook is about the application of the tools and techniques used for business students for their data analysis. I have applied all the tools and techniques using SPSS and Statistica and tried to guide you in the easiest way possible (with the path and interpretation). This work proves very helpful in research work as well as for data analysis. In this guide I used 5 variables out of which 2 variables were qualitative (behavior & investment decision) and remaining 3 were quantitative variables (foreign exchange, closing values of ABC company and unit prices of ABC company). Tools and techniques which are practiced in complete book includes: Univariate Analysis, Bivariate Analysis,, histogram, pie charts, bar chart, regression analysis including simple regression and multiple regression models, parametric and non-parametric tests, mean comparison and factor analysis with interpretation.

What is SPSS?

A Statistical Package for social sciences to analyze their data. It is a software which is used for statistical analysis of qualitative and quantitative data.

TYPES OF ANALYSIS

There are three types of analysis:

1. Univariate Analysis 2. Bivariate Analysis 3. Multivariate Analysis

UNIVARIATE ANALYSIS

Qualitative Variables:

Path:

Analyze →Descriptive stats → Descriptive

Followings are my qualitative variables:

Sr. #	Variables
1	Behavior
2	Investment Decision

Behavior:

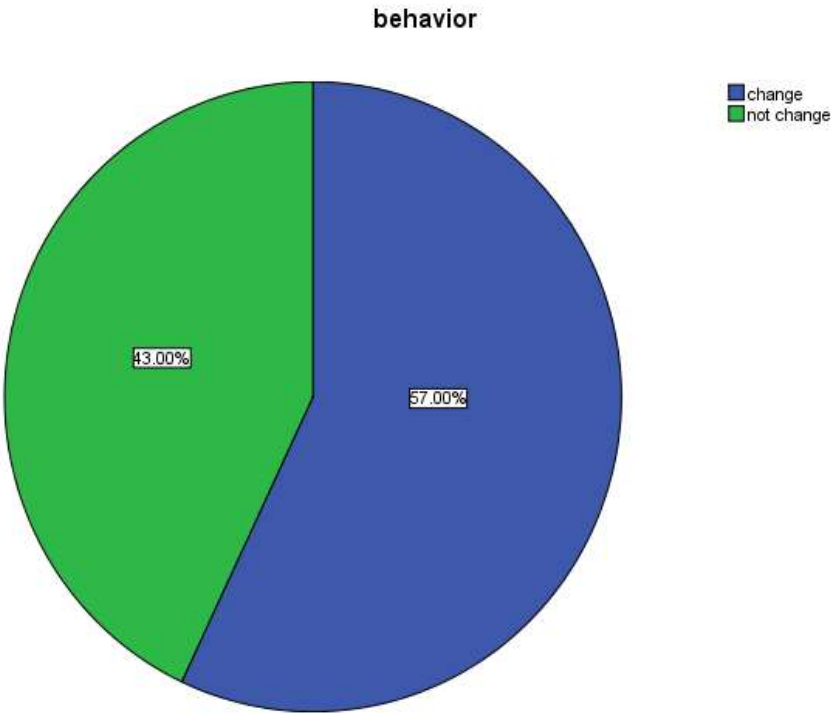
Behavior

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	change	57	57.0	57.0	57.0
	not change	43	43.0	43.0	100.0
	Total	100	100.0	100.0	

Interpretation:

The behavior is qualitative variable and in case of qualitative variable we make bar chart or pie chart and frequency table. According to given results out of 100 respondents 43%

of the respondents do not change their behavior and 57% of respondents change their behavior.

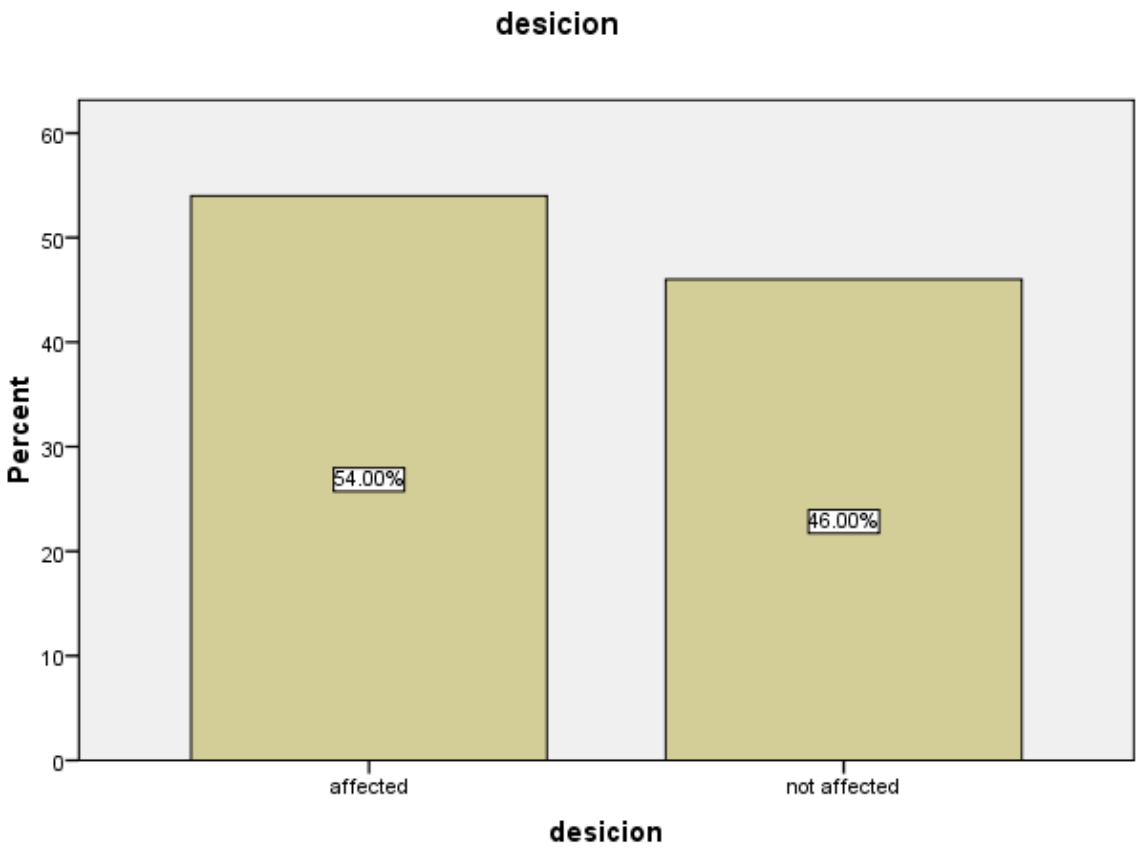


Interpretation:

Behavior is qualitative variable and in case of qualitative variable we make bar chart or pie chart. This time I applied pie chart. The data shows that almost half of the respondents change their behaviors whose numeric value is 57% while other who do not change their behavior are 43% respondents.

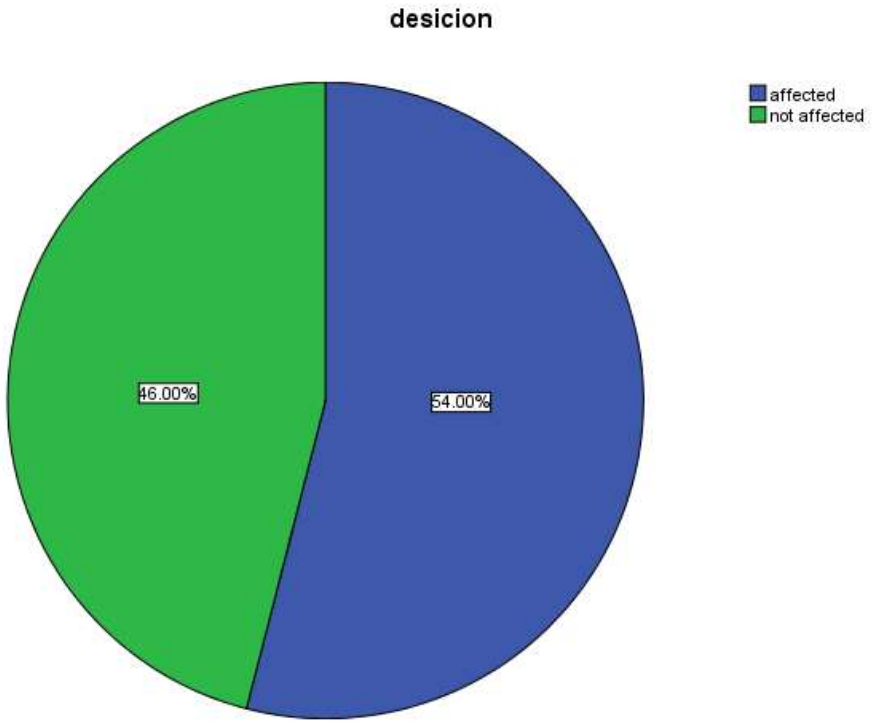
Decision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	affected	54	54.0	54.0	54.0
	not affected	46	46.0	46.0	100.0
	Total	100	100.0	100.0	



Interpretation:

The investment decision is qualitative variable and in case of qualitative variable we make bar chart or pie chart and frequency table. According to given results,46% respondents out of 100 respondents show unaffected investment decision and 54% of respondents show affected investment decision.



Interpretation:

Investment decision is qualitative variable and in case of qualitative variable we make bar chart or pie chart. This time I applied pie chart. 54% respondents out of 100 respondents shows affected investment decision and 46% respondent do not show affected investment decision.

Quantitative variables

Path:

Analyze →descriptive stats → frequency

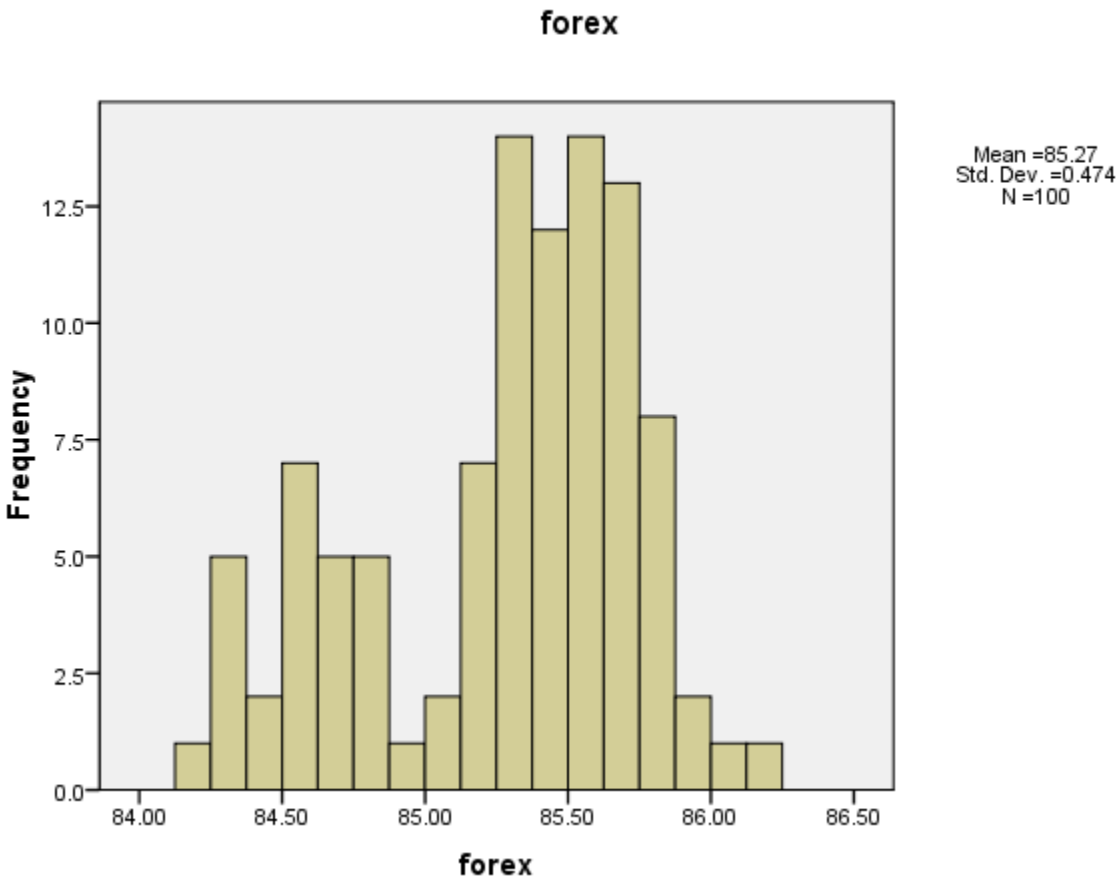
My quantitative variables include:

Sr. #	variables
1	Foreign exchange
2	Trading volume
3	Closing values

1. **Foreign Exchange (forex):**

Descriptive stats

Valid observations	**100**
Missing	**0**
Mean	**85.2709**
Minimum	**84.22**
Maximum	**86.18**
Rang	**1.96**
Standard deviation	**0.47379**
Variance	**0.224**



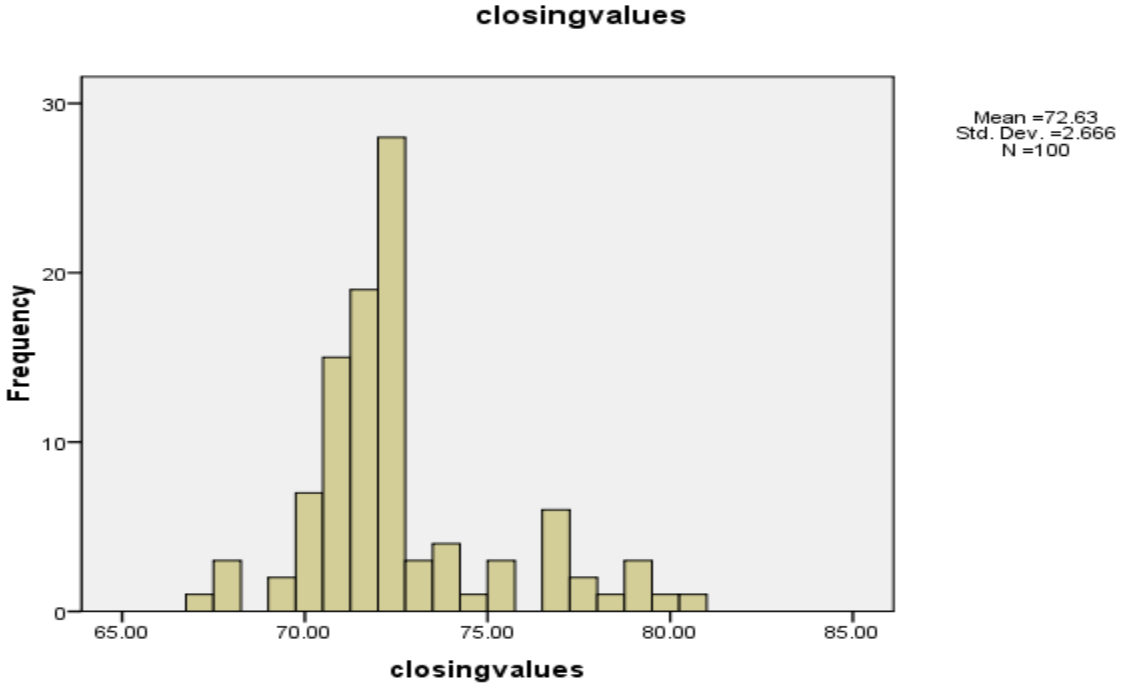
Interpretation:

The foreign exchange is Quantitative variable and for quantitative variables we make histogram. According to results, the average value is 72.6300. While the standard deviation and variance is 0.224 and 0.47379 respectively. Range, maximum and minimum values are 1.96, 86.18 and 84.22 respectively.

2. Closing values of ABC Company:

Descriptive stats

Valid observations	**100**
Missing	**0**
Mean	**72.6300**
Minimum	**67.24**
Maximum	**80.41**
Rang	**13.17**
Standard deviation	**2.66598**
Variance	**7.107**



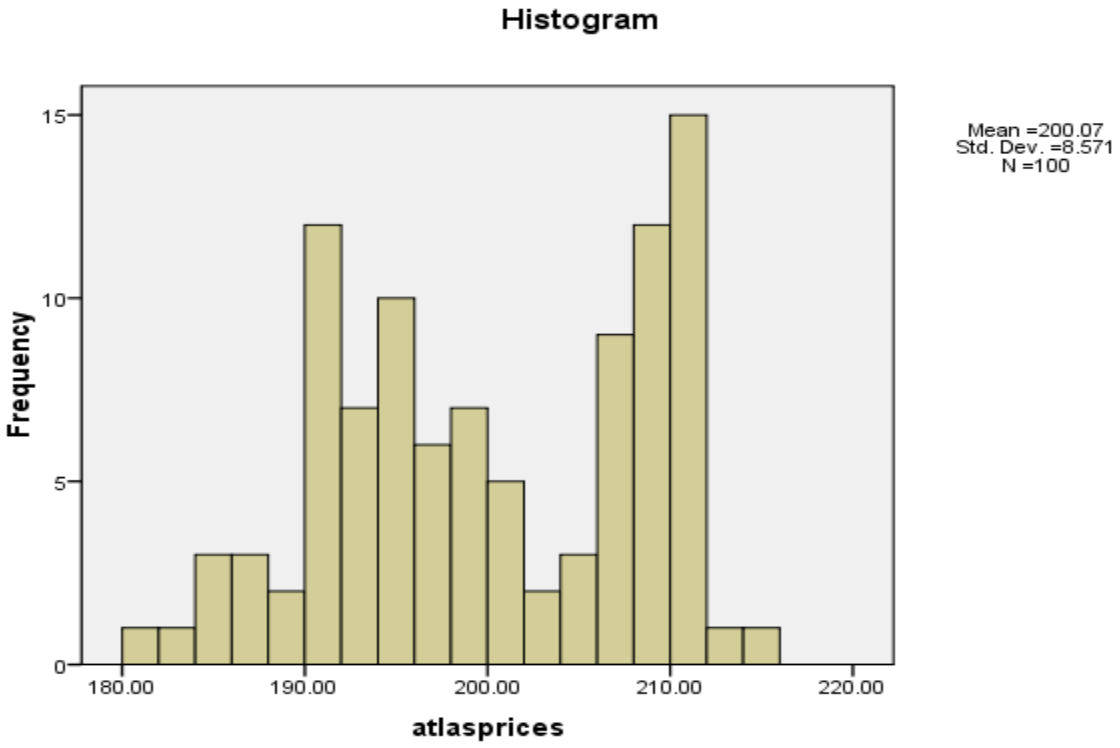
Interpretation:

The closing value is Quantitative variable and for quantitative variables we make histogram. According to results the average value is 72.6300. While the standard deviation and variance is 2.66598 and 7.107respectively. Range, minimum and maximum values are13.17, 67.24 and 80.41 respectively.

3. Unit prices (Trading price/value):

Descriptive stats

Valid observations	**100**
Missing	**0**
Mean	**200.07**
Minimum	**180.05**
Maximum	**214.11**
Rang	**34.06**
Standard deviation	**8.57063**
variance	**73.456**



Interpretation:

The atlas price is Quantitative variable and for quantitative variables we make histogram. According to results the average value is 200.07. While the standard deviation and variance is 8.57063 and 73.456 respectively. Range, minimum and maximum values are 34.06, 180.05 and 214.11 respectively.

Bivariate analysis

Association

Path:

Analyze →descriptive stats → Cross tabs

(statistics→chi-square)

When there are variables which are qualitative in nature then we apply association. Value of chi-square should always positive and starts from 1 to infinity.

Qualitative variables are:

- Behavior change
- Investment decision

Behavior V/S Investment Decision

behavior * desicion Crosstabulation

			desicion		
			affected	not affected	Total
behavior	Change	Count	44	13	57
		Expected Count	30.8	26.2	57.0
	not change	Count	10	33	43
		Expected Count	23.2	19.8	43.0
Total		Count	54	46	100
		Expected Count	54.0	46.0	100.0

Interpretation:

The above-mentioned crossed tables show that out of 57 individuals who changes their behavior, investment decision of 44 individuals affected due to changing behavior while

13 individual's investment decision remains unaffected. Likewise, total 43 respondents out of 100 respondents do not change their behavior. When behavior not changed then the investment decision of 33 respondents also remains unaffected while 10 respondents' investment decision got affected.

1. Hypothesis Formulation

Null Hypothesis Ho: There is no association between behavior change and investment decision.

Alternative Hypothesis H1: There is association between behavior change and investment decision.

2. Level of Significance: $\alpha = 0.05$

3. Test-statistic: Chi-Sqaure test of association

4. Calculations:

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	28.706[a]	1	.000	.000	.000	
Continuity Correction[b]	26.575	1	.000			
Likelihood Ratio	30.136	1	.000	.000	.000	
Fisher's Exact Test				.000	.000	
Linear-by-Linear Association	28.419[c]	1	.000	.000	.000	.000
N of Valid Cases	100					

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 19.78.

b. Computed only for a 2x2 table

c. The standardized statistic is 5.331.

Pearson chi-square = 28.706

5. Critical Region: $p < \alpha$ (Ho rejected)

p = 0.000

6. Conclusion: To check the association between qualitative variables, we apply chi-square test. Before applying the test first we check expected count **if expected count is**

more than 5 then we apply chi square test. On the basis of given sample data it is concluded that there association between behavior change and investment decision at the significance level of 0.01 so we reject H0 an d accept H1. It means that if any change takes place in behavior of an individual then investment decision also got affected.

(If expected count is less than 5)

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N of Valid Cases	100					

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c. The standardized statistic is 5.331.

5. Critical Region: $p < \alpha$ (Ho rejected)

p = 0.000

6. Conclusion: To check the association between qualitative variables, we apply chi-square test. Before applying the test, we check expected count **if expected count is less**

than 5 then we apply Fisher's test of association. On the basis of given sample data it is concluded that there association between behavior change and investment decision at the significance level of 0.01 so we reject H0 an d accept H1. It means that if there is any change takes place in behavior of an individual then investment decision also affected.

Quantitative Variables

Following are my variables:

- **Foreign exchange**
- **Closing values**
- **Trading prices**

Normality test

Path:

Analyze → Non-parametric → 1 sample KS

1. Foreign exchange rate:

1. **Hypothesis Formulation:**

Null Hypothesis Ho: Data is normal

Alternative Hypothesis H1: Data is non-normal

2. **Level of Significance:** $\alpha = 0.05$
3. **Test-statistic:** one sample K-S test
4. **Calculations:**

One-Sample Kolmogorov-Smirnov Test

		forex
N		100
Normal Parameters[a]	Mean	85.2709
	Std. Deviation	.47379
Most Extreme Differences	Absolute	.161
	Positive	.080
	Negative	-.161
Kolmogorov-Smirnov Z		1.606
Asymp. Sig. (2-tailed)		.011

a. Test distribution is Normal.

5. Critical Region: $p < \alpha$ (for rejection of Ho)

$p > \alpha$ (Ho accepted)

P value = 1.606

6. Conclusion: to check the normality of data we apply K-S test. So on the basis of given sample data, it is concluded that our data is normal because p value is greater than alpha so Ho accepted.

2. Closing values:

1. Hypothesis Formulation:

Null Hypothesis Ho: Data is normal

Alternative Hypothesis H1: Data is non-normal

2. Level of Significance: $\alpha = 0.05$

3. Test-statistic: one sample K-S test

4. Calculations:

One-Sample Kolmogorov-Smirnov Test

		Closingvalues
N		100
Normal Parameters[a]	Mean	72.6300
	Std. Deviation	2.66598
Most Extreme Differences	Absolute	.237
	Positive	.237
	Negative	-.096
Kolmogorov-Smirnov Z		2.365
Asymp. Sig. (2-tailed)		.000

a. Test distribution is Normal.

5. Critical Region: $p < \alpha$ (for rejection of Ho)

$p > \alpha$ (Ho accepted)

P value = 2.365

6. Conclusion: to check the normality of data we apply K-S test. So on the basis of given sample data, it is concluded that our data is normal because p value is greater than alpha so Ho accepted.

3. Atlas prices:

1. Hypothesis Formulation:

Null Hypothesis Ho: Data is normal

Alternative Hypothesis H1: Data is non-normal

2. Level of Significance: $\alpha = 0.05$

3. Test-statistic: one sample K-S test

4. Calculations:

One-Sample Kolmogorov-Smirnov Test

		atlasprices
N		100
Normal Parameters[a]	Mean	200.0694
	Std. Deviation	8.57063
Most Extreme Differences	Absolute	.146
	Positive	.086
	Negative	-.146
Kolmogorov-Smirnov Z		1.464
Asymp. Sig. (2-tailed)		.028

a. Test distribution is Normal.

5. Critical Region: $p < \alpha$ (for rejection of Ho)

$p > \alpha$ (Ho accepted)

P value = 1.464

6. Conclusion: to check the normality of data we apply K-S test. So, on the basis of given sample data, it is concluded that our data is normal because p value is greater than alpha, so Ho accepted.